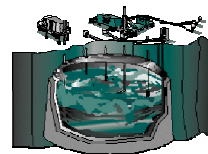




## Automated Monitoring System for Fluid Level and Density in High-Level Waste Tanks



**Developer:** Science & Engineering Associates, Inc.

**Contract Number:** DE-AC21-96MC33126

**Crosscutting Area:** CMST

**Tanks**  
**FOCUS AREA**

### Problem:

The Department of Energy (DOE) has over 300 underground storage tanks (USTs) that contain radioactive and chemical mixed waste generated from weapon materials production. Many of the USTs at Hanford have exceeded their life expectancy and 67 of them are believed to be leaking. The tanks are closely monitored both inside and out for waste stability, leaks, and releases of materials. Stratification of the waste contents makes it difficult to monitor tank content levels for anything but the uppermost layer of the stratified contents. There are also a large number of

tanks within the DOE complex that are used during processing and handling of waste from DOE clean up operations. For example, at the Savannah River Site (SRS) there are process tanks involved with waste vitrification at the Defense Waste Processing Facility (DWPF). It is necessary to monitor the levels of liquid, salt crust solids and sludge, and their interfaces.

Additionally, there are processing tanks at SRS utilized to separate benzene from an aqueous solution. It is also necessary to monitor the fluid levels of both the organic and aqueous solutions. Current methods of monitoring fluid and interface

levels and density are slow, expensive, provide limited data and, in some cases, may expose personnel to radioactive and hazardous materials and conditions.

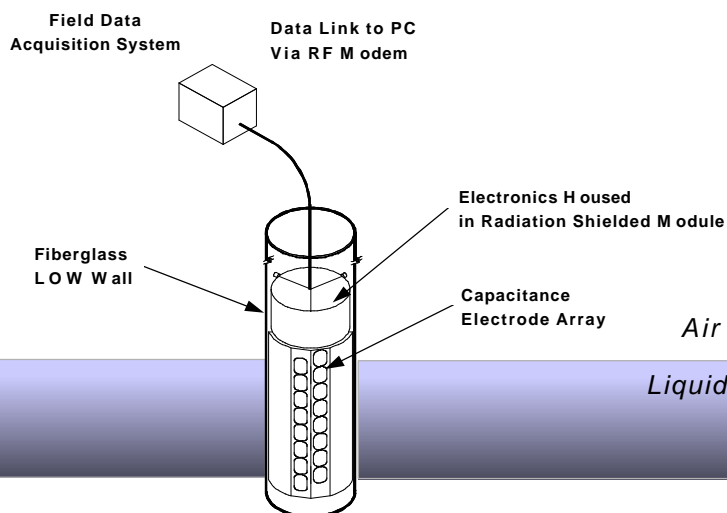
### Solution:

The solution to these problems is the development and demonstration of real-time continuous capacitance and acoustic based monitoring systems for measurement of waste fluid levels and fluid densities in DOE waste and process tanks. The systems consist of a sensor array with needed radiation shielding, placed inside of an existing liquid observation well (LOW) or equivalent conduit, coupled with appropriate data logging and acquisition system, to provide real time information on the tank fluid levels and fluid density.

### Benefits:

- ▶ The SEAlvel™ systems would permit monitoring of fluid levels on a real-time basis
- ▶ Real-time measurement would promptly alert site personnel to changes in fluid levels and densities
- ▶ System design would permit implementation through existing LOWs or access conduits in tanks at Hanford, SRS or other DOE sites
- ▶ The systems would provide the

### CAPACITANCE SENSOR ARRAY IN LOW



- ▶ The SEAlevel™ systems are expected to increase monitor performance life and reduce cost significantly

This project involves the development of two approaches by Science & Engineering Associates, Inc. (SEA) which may be applied for a variety of needs for monitoring liquid/material levels in DOE tanks. The development effort was administered under contract through the Federal Energy Technology Center (FETC) with funding provided by the DOE Office of Science and Technology (OST). The goal of the program is to significantly reduce the cost and complexity of monitoring fluid levels in waste and process tanks.

The SEALevel™ system development project is divided into two phases. The purpose of Phase I is to design the system and conduct laboratory tests with prototypes of the sensor arrays. In general the goal of Phase I is to complete all of the work necessary so that a full-scale system can be fabricated and fielded during Phase II of the project.

SEA is a high technology contract research and development organization providing services to the national needs. The Environmental Technologies Division of SEA develops, demonstrates, and provides field services in the areas of environmental characterization, monitoring, and remediation. For information on this project, the contractor contact is:

DOE's Federal Energy Technology Center supports the Environmental Management - Office of Science and Technology by contracting the research and development of new technologies for waste site characterization and cleanup. For information regarding this project,

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